

Institute for Research and Technical Assistance

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Clean/Green Technologies

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Katy Wolf, Executive Director

GREEN TECHNOLOGIES: CLEANING AND ADHESIVE APPLICATIONS

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FOCUS ON SCAQMD RULES 1171, 1122, 1168

- Demonstrated Cleaning Alternatives
 - Repair and Maintenance Cleaning
 - Batch Loaded Cold Cleaning
 - Vapor Degreasing
- Emerging Cleaning Alternatives
 - Spray Gun Cleaning
 - Screen Printing Cleanup
 - Lithographic Printing Cleanup
 - Electronics Cleaning
- Alternative Adhesives
 - Demonstrated: Foam Bonding - Emerging: Veneer Bonding/Laminating

REPAIR AND MAINTENANCE CLEANING

- · Historically used Mineral Spirits
- · Industries: Auto Repair, Industrial
- Suitable Alternatives: Water-Based Cleaners

REPAIR & MAINTENANCE ANNUALIZED COST STUDIES

Case Studies	Mineral Spirits	Water-Based Cleaners	Savings
Honda Acura Service Facility	\$ 1,991	\$ 1,668	\$ 323
Transmission Shop	\$17.100	\$14,838	\$2,262

BATCH LOADED COLD CLEANING

- Historically Used Various VOC, Chlorinated Solvents
- Industries: Manufacturers, Aerospace, Rebuilders
- Suitable Alternatives: Water-based Cleaners, Acetone

BATCH LOADED COLD CLEANING ANNUALIZED COST STUDIES

Case Studies	Mineral Spirits	Water-Based Cleaners	Savings
Machine Shop With 7 employees	\$2,556	\$2,080	\$476
Case Studies	Solvent Cleaning	Water-Based Clean/Acet.	Savings
Repairs Aircraft Components, 60 employees	\$8,469	\$9,085	(\$616)

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VAPOR DEGREASING

- · Historically Used Halogenated Solvents
- · Industries: Range of Industrial Plants
- Suitable Alternatives: Water-Based Cleaners, some other Processes

VAPOR DEGREASING ANNUALIZED COST STUDIES

Case Studies	Perc Vapor Degreasing	Water-Based Cleaning	Savings
Sawblade Manufacturer (7 employees)	\$30,850	\$2,531	\$28,319
Case Studies	Vapor Degreasing	Water-Based Cleaning	Savings
Small Metal Polishing Business	\$193,509	\$160,441	\$33,068

SPRAY GUN CLEANING

- Currently Performed with Variety of VOC Solvents
- Industries: Companies that Apply Coatings, Adhesives
- Suitable Alternatives: Water-Based Cleaners, Soy-Based Cleaners, Acetone

ALTERNATIVES IN SPRAY GUN CLEANING BY SECTOR

Sector	Alternative(s)
Wood Furniture	Water-Based Cleaners, Acetone
Metal	Acetone
Aerospace	Acetone
Auto Body	Acetone
Architectural	Water-Based Cleaners, Soy- Based Cleaners, Acetone
Adhesives	Water-Based Cleaners, Soy- Based Cleaners, Acetone

SCREEN PRINTING CLEANUP

- Currently Performed with Variety of VOC Solvents
- Industries: Textile Printers, Banner Printers, Bottle Printers, Captive Manufacturers
- Suitable Alternatives: Water-Based Cleaners, Soy-Based Cleaners, Acetone

SCREEN PRINTING ANNUALIZED COST STUDIES

Case Studies	Mineral Spirits Cleaner	Acetone Blend	Savings
Manufactures Metal Nameplates	\$21,745	\$14,034	\$7,711



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LITHOGRAPHIC PRINTING CLEANUP

- Currently Performed with Variety of VOC Solvents
- Industries: Newspapers, Cartons, Inserts, Metal
- Suitable Alternatives: Water-Based Cleaners, Soy-Based Cleaners, Acetone

LITHOGRAPHIC PRINTING CLEANUP ANNUALIZED COST STUDIES

Case Studies	Mineral Spirits Cleaner	Water-Based Blend	Savings
Newspaper Off- press printing	\$9,437	\$2,280	\$7,157
Case Studies	Mineral Spirits Cleaner	Acetone Blend	Savings
Manufactures Metal Nameplates	\$3.955	\$944	\$3,011

ELECTRONICS CLEANING

- Currently Performed with Ozone Depleters, Isopropyl Alcohol, other VOC Solvents
- Industries: Field Electrical, PC Board Rework, Hybrid Circuits, Motor/Generator Manufacture
- Variety of Alternatives Suitable Depending on the Application

POROUS SUBSTRATE BONDING

- Historically Performed with TCA, Methylene Chloride, VOC Adhesives
- Industries: Foam Fabricators, Mattress Manufacturers, Upholstered Furniture Manufacturers
- Suitable Adhesives: Water-Based, Acetone-Based and Hot Melt

POROUS SUBSTRATE BONDING ANNUALIZED COST STUDIES

Case Studies	Acetone Adhesive	Water-Based Adhesive	Savings	
Foam Fabricator	\$232,870	\$225,994	\$6,876	



Alternative Materials Technology

Wade Potter

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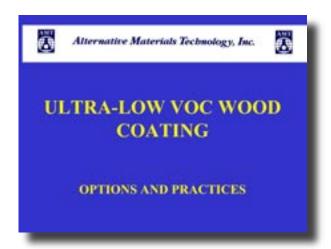
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Wade Potter, Director of Research and Development



HISTORY & BACKGROUND

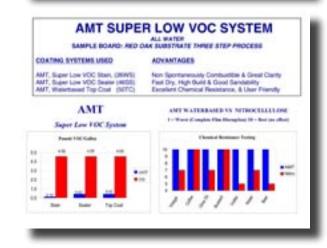
- Furniture companies in California started small & used simple finishes.
- · Waterbed industry & oak revolution.
 - Grew larger and bought more wood milling equipment.
 - Original finishes used were Danish oils.
 - Second generation Danish oil & Nitrocellulose lacquer.
 - Third generation Danish oil, Nitrocellulose sanding sealer & Nitrocellulose lacquer top coat.
- · Very few companies had traditional lines.
 - No heat
 - No moving conveyor system.
 - Little or no temperature control in manufacturing facility.
 - No air make-up systems for dust control.
- Traditional high VOC Nitrocellulose coatings worked in these environments.
- These non-traditional facilities created big challenges for coating manufacturers trying to reduce VOCs.

OVERVIEW OF TECHNOLOGIES

- · Three main types of Ultra-Low VOC coatings.
- · All Waterbased
 - Waterbased stain
 - Waterbased sealer
 - Waterbased top coat
- · Hybrid I
 - Solvent-based stain
 - Waterbased sanding scaler
 - Waterbased top coat

PRODUCT CHARACTERISTICS

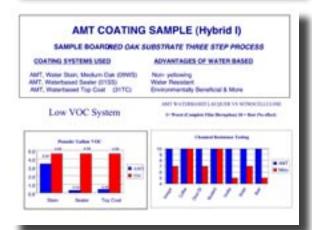
- · All Water System
 - Advantages
 - · Higher solids coating.
 - · Non-flammable.
 - · Safer for workers.
 - Disadvantages
 - · Usually requires two sealers,
 - · Sanding must be done between each seal step.
 - · More difficult to achieve the "traditional look."
 - · Requires drying ovens for process control.



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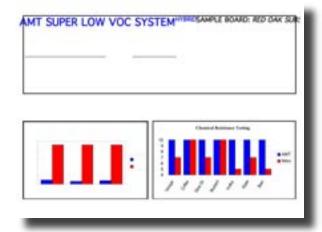
Wade Potter, Director of Research and Development

- · Hybrid I
 - Solvent stain, water sealer, water top coat.
- Advantages
 - Gives the traditional "look"
 - Non-flammable sanding sealer and top coat,
 - Safer for workers.
- · Disadvantages
 - Spontaneously combustible stain.
 - Often requires two sanding sealers.
 - Requires drying ovens for process control.



- Hybrid II
 - Solvent-based stain.
 - Nitrocellulose sanding sealer.
 - Waterbased top coat.
- · Most widely accepted system is Hybrid II
 - Requires the least amount of factory and finishing process changes.
 - This system has recently been approved for use at a major Los Angeles familiare company under the category of "Best Available Technology".

- Advantages
 - Easy to achieve traditional "look".
 - Requires minimum factory or process changes.
 - Greatly reduces grain raise associated with waterbased sealers.
 - Non-spontaneously combustible.
 - Very good open time and workability.
- · Disadvantages
 - Requires drying oven for the waterbased top coat.
 - Requires high acetone content in sanding sealer.



MAJOR CONSIDERATIONS

- · Process Control
 - Key to producing quality products with Ultra-Low VOC coatings is process control.
 - Consistent & controlled process conditions.
 - · Moving line.
 - . Controlled factory temperature.
 - · Controlled dry time.
 - · Duct control.
 - · Controlled "dry" air supply.
 - Quality Ultra-Low VOC coatings combined with good process control can greatly reduce VOC's emitted by wood products manufacturers.



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Suggestions

- Incentives
- A tax incentive should be considered for companies that install process control.
- A tax consideration should also be considered for companies using Ultra-Low VOC coatings.
- If not a tax consideration, at minimum, greatly reduce record-keeping burden.



Envirocure

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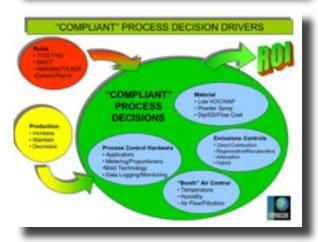


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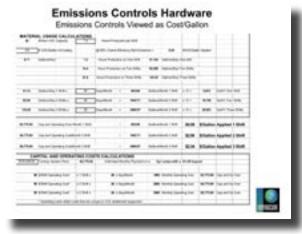
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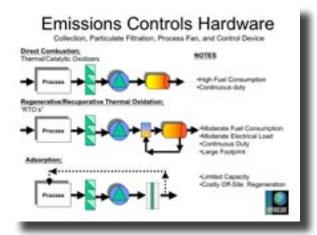
Compliant VOC/HAP Process Process Control Review - Material Selection - Advande Coating Materials - Weler Borns, LivEE, Predix, Fel - Booth/Environment - Air Handling and Make-Lip - Temperature and Make-Lip - Removert Total Environme (FTE) - Applications Materiang - Electrostatic, Air-Assisted Airless - Automatic Proportioning - Man-Machine Charts - Process Simulation - GOAL: Process Optimization* *No one item, but a combination of choices will net the most cost effective Compliant Process.

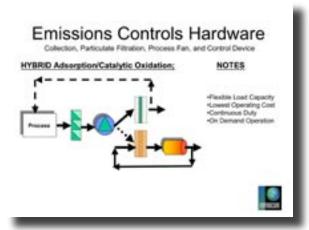


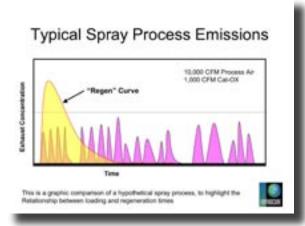
Emissions Controls Hardware THE THREE MAJOR COST DRIVERS - AIRFLOW (CFM) - How many cubic feet per minute are you exhausting from the process? - LOAD - RATE (Pounds of VOC/HAP per Hour) - How quickly are you introducing material into the process? - DUTY CYCLE (Hours/Day-Week) - What is the operation schedule/shifts? THESE FACTORS DRIVE EQUIPMENT CAPITAL and OPERATING COSTS

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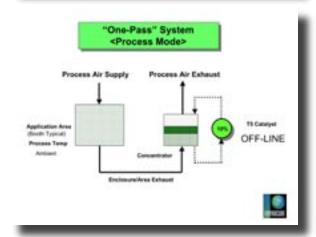
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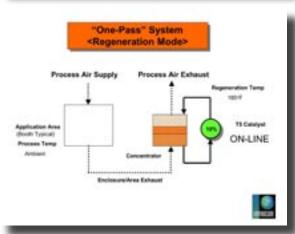






Adsorption Process Description Your VOCHAP laden exhaust or sinam is timed to remove eventying and other particulates. . Then drawn through the advertising concentrator bed. The load colocitation process and the process of the second of th



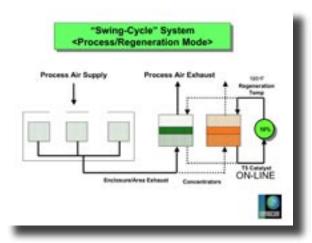


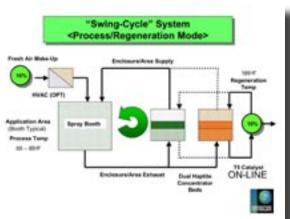


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ALTERNATIVE TECHNOLOGIES FOR DRY CLEANING

Deborah Davis, President, Cleaner by Nature, Inc.

ALTERNATIVES TO THE USE OF PERCHLOROETHYLENE IN DRY CLEANING

- · Hydrocarbon Cleaning
- · Wet Cleaning
- · Liquid Silicone Cleaning

HYDROCARBON CLEANING

Environmental

- Positive
 - High flashpoint
 - Not a hazardous pollutant
- Negative
 - Toxicity
 - Generates hazardous waste
 - Requires permits
 - May be subject to additional regulations

HYDROCARBON CLEANING

Cost

- Positive
 - Overall cost about the same
 - Cost of solvent a little less
 - Cost of labor about the same
- Negative
 - Cost of equipment slightly more

HYDROCARBON CLEANING

Cleaning Power/Customer Satisfaction

- Positive
 - Cleaning is about the same
- Negative
 - Has odor
 - Chemical damage to beads, etc.

CO2

Environmental

- · Positive
 - Non-toxic
 - No hazardous waste
 - Not regulated
- Negative
 - Ozone depleting chemical
 - Chemical damage to beads, etc.

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Deborah Davis, President

CO,

Cost

- Positive
 - Labor cost about the same
- Negative
 - Equipment cost significantly higher/\$110,000 vs. \$50,000 for PERC machine
 - Solvent more expensive

CO2

Cleaning Power/Customer Satisfaction

- Positive
 - No odor
 - High environmental marks
- Negative
 - Cleans less than PERC
 - Can not be used on every product
 - Can damage some fabrics

WET CLEANING

Environmental

- Positive
 - High environmental marks
 - No hazardous waste
 - No permit requirement

WET CLEANING

Cost

- Positive
 - Low equipment cost/\$20,000 vs \$50,000 for PERC machine
 - Solvent is less
- Negative
 - Need pressing equipment/ \$10,000
 - Labor costs are much more

WET CLEANING

Cleaning Power/Customer Satisfaction

- · Positive
 - Excellent at removing stains
 - No odors
 - High environmental marks
- Negative
 - Problem with shrinkage
 - More spotting necessary on oil stains

LIQUID SILICONE

Environmental

- · Positive
 - High environmental marks
 - No hazardous waste
 - No regulation



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LIQUID SILICONE

Cost

- Positive
 - Labor cost about the same
- Negative
 - Equipment is more
 - Solvent is more

LIQUID SILICONE

Cleaning Power/Customer Satisfaction

- Positive
 - Cleaning power is good
 - No odor
 - No damage
 - High environmental marks



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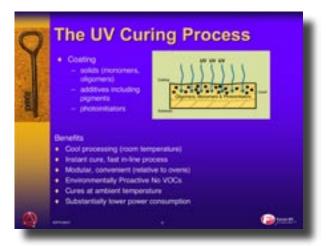
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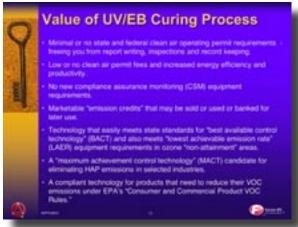
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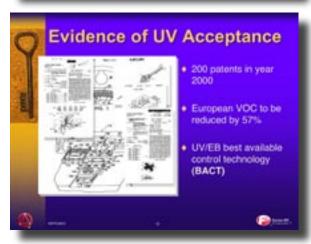














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